MASTER DRAWING LIST

DWG. NO.	REV. LET.	NO. OF SHEETS	TITLE
A-PL-DK8-E-0		1	REAL TIME CLOCK (PARTS LIST)
A-SP-DK8-EA-1		6	Engineering Specs
A-SP-DK8-EA-2			Checkout Procedure
A-SP-7665126-0-0		2	Acceptance Procedure
E-CS-M882-0-1	##	2	REAL TIME CLOCK (LINE)
LIBKIT-8E-DK8E	REF		PROGRAM LIBRARY KIT

REVISIONS			
REV.	DATE	CHG. NO.	APP'D.
A	3/23/71	00001	A.D.
B	7/71	00002	ands
C	7/71	00003	ands

DRN. [signature] DATE 2-25-71
CHK'D. [signature] DATE 2-25-71
ENG. [signature] DATE 2-25-71
PROJ. ENG. [signature] DATE 2-25-71
PROD. DATE
FIRST USED ON PDP8-E
SCALE ##
SHEET 1 OF 1

digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS

TITLE
DK8-EA
Real Time Clock (Line)

SIZE	CODE	NUMBER	REV.
A	ML	DK8-EA	C

DIST.

DEC FORM NO. 16--1033
DRA 103

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

PARTS LIST

MADE BY K. GULICK	CHECKED K. RUSS	SECTION
DATE 3/23/71	DATE 3/23/71	1
ENG Al DeTurco	PROD Terry Baylor	ISSUED SECT.
DATE 4/6/71	DATE 4/7/71	1

ITEM NO.	DWG NO./PART NO.	DESCRIPTION	QUANTITY/VARIATION DK8-EA	DK8-EC
1	E-CS-M882-0-1	REAL TIME CLOCK (LINE)	1	-
2	E-CS-M883-0-1	REAL TIME CLOCK (CRYSTAL)	-	1
3	D-IA-7007128-0-0	28 VAC POWER CABLE	1	-

TITLE	ASSY NO.	SIZE	CODE	NUMBER	REV.	ECO NO.
REAL TIME CLOCK DK8-E	SHEET 1 OF 1	A	PL	DK8-E-0		
		DIST.				

DEC FORM NO. 16-1031
DRA 110

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 2/4/71

TITLE Engineering Specifications for DK8-EA (M882) Real Time Clock (line)

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE

ENG	APPD	SIZE	CODE	NUMBER	REV
A. DeLuca	Vogelsang	A	SP	DK8-EA-1	

DEC FORM NO. DRA 107

1 6

DK8-EA Real Time Clock (line frequency)

1. General Description

1.1 The DK8-EA M882) counts intervals of time at 100 or 120 times a second. The frequency is determined by the power line 50 or 60 Hz whichever the case may be. The DK8-EA receives this information from the 28 VCT winding of the H724 or H724A power supply and operates at twice the line frequency.

The DK8-EA plugs into the OMNIBUS of the PDP8-E processor. The line frequency is received through an 8 pin Mate-n-lock connector at the edge of the board. A cable (DEC part number D-IA-7007128-0-0) is the means by which the DK8-EA connects to the 28 VCT winding of the H724 or H724A power supply. Each of the AC inputs from the H724 or H724A power supply is wired, by means of etch on the M882, to an adjacent pin so as not to dead-end the 28 VCT winding. This permits another option requiring this power to also make use of it.

1.1.1 All the logic for the DK8-EA is contained on one 8½ inch quad module. All three IOT's for the DK8-EA are decode on this module and are listed below:

MNEMONIC	CODE	OPERATION
CLEI	6131	Set Interrupt
CLDI	6132	Clear Interrupt
CLSK	6133	Skip on clock Flag and clear flag

1.2 Operation

Refer to DK8-EA block diagram and timing diagram. 6132 or initialize will clear the interrupt request flag. The interrupt request flag is set with IOT 6131. The interrupt request line will be asserted if the slave clock flag is set from the master clock flag and will remain asserted until it is cleared by 6132, initialize or 6133. The master clock flag is set. Every time the frequency source goes high 100 or 120 times a second.

The skip line is pulled to ground, asserted, if the slave clock flag has been set and the IOT 6133 is issued. The skip line stays at ground for the duration of the IOT 6133. At the end of this IOT the master clock flag will be cleared. TP1 the start of any IOT will clear or set the slave flag depending upon the output state of the master flag. If the master flag has been cleared then the slave will be cleared. With both the master and slave cleared no skip can occur until the next clock pulse which will set the master flag and TP1 will set the slave.

It takes two IOT's to sync to the frequency source the first to clear the master clock flag and the second to skip the moment the master clock flag goes high which will be when the frequency source clock pulse goes high.

Sample Program

```
6133
JMP.-1
6133
JMP.-1
```


2. Operating Conditions

Temperature - $30^{\circ}F$ - $120^{\circ}F$

Humidity - 10 - 90% non condensing

Power Requirements

+5 volts - 210 ma
14 VAC - 1.4 ma

Frequency stability - depended on line frequency

Line Frequency Specification

The usual maximum deviation from the standard 60 cycles is $\pm$ 3/100 or .05% this maximum might be daytime or night time operation. Except on rare occasions when deviations of 1/10 cycle might occur. The usual normal deviations are about 1/40 of a cycle during both daytime and night time operation.

The center frequency average almost exactly 60 cycles.

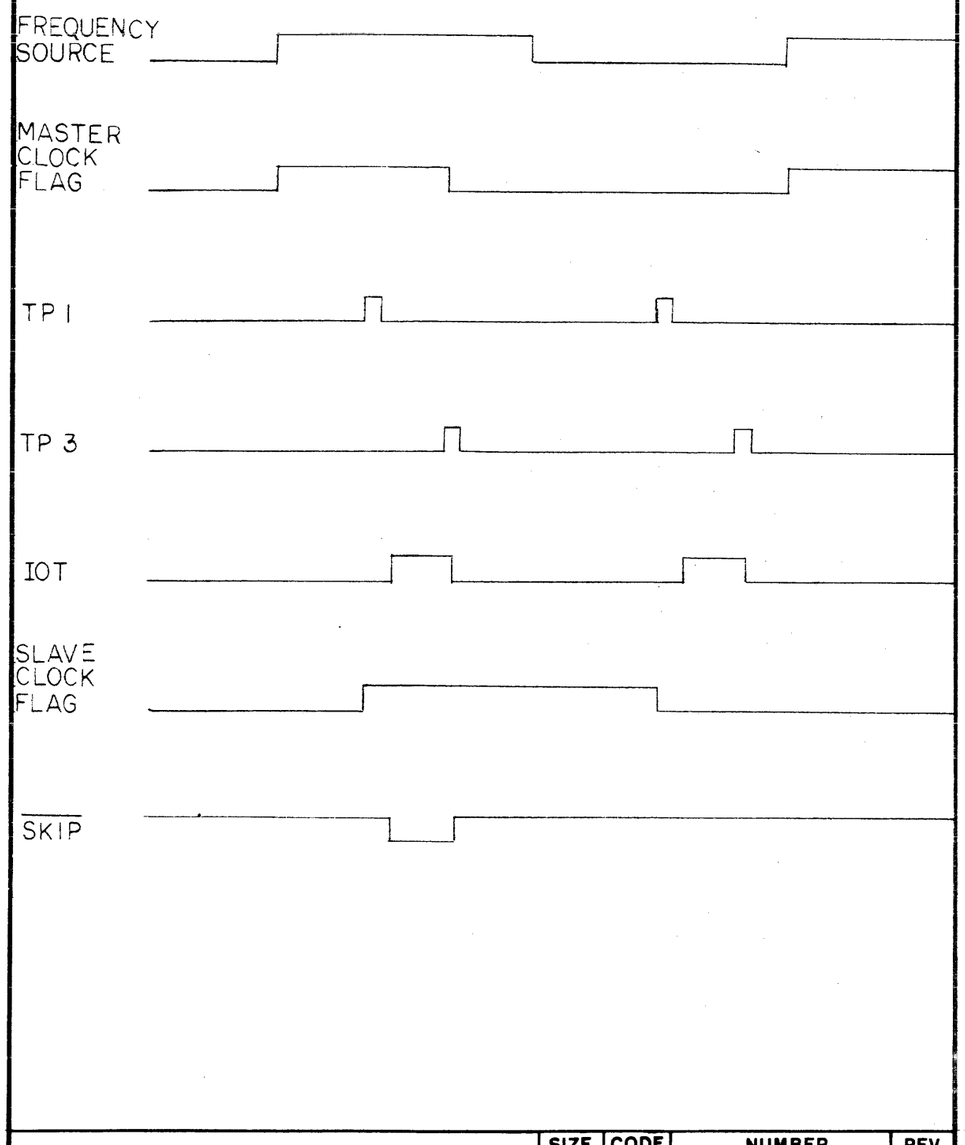
For local line frequency specifications consult the local power company.

3. Software:

MAINDEC-8E-D8AA-D-(D)	Write Up
MAINDEC-8E-D8AA-PB	Tape

ENGINEERING SPECIFICATION [redacted] CONTINUATION SHEET

TITLE DK8-EA TIMING DIAGRAM



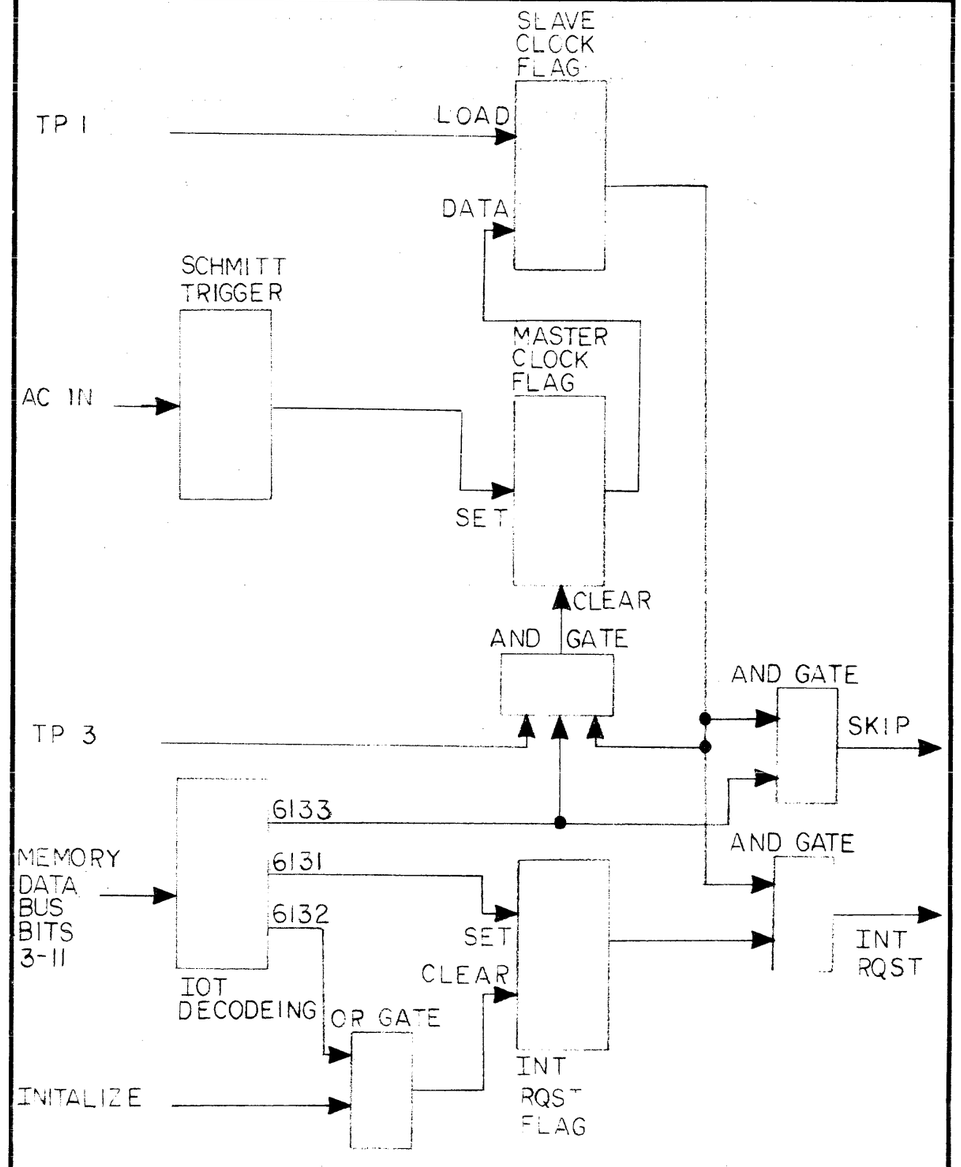
	SIZE	CODE	NUMBER	REV
	A	SP	DK-EA-1	

DEC FORM NO *16-1022*
DRA 108

SHEET 5 OF 6

ENGINEERING SPECIFICATION [redacted] CONTINUATION SHEET

TITLE DK8-EA BLOCK DIAGRAM



	SIZE	CODE	NUMBER	REV
	A	SP	DK8-EA-1	

DEC FORM NO *16-1022*
DRA 108

SHEET 6 OF 6

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION DATE 3/17/71

TITLE DK8-EA, EC TEST PROCEDURE

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE

ENG	APPD	SIZE	CODE	NUMBER	REV
N. DeLuca	F. Griffith	A	SP	DK8-EA-2	

DEC FORM NO. DRA 107

ENGINEERING SPECIFICATION digital CONTINUATION SHEET

TITLE DK8-EA, EC TEST PROCEDURE

1.0 Equipment
- 1.1 PDP8/e Standard
- 1.2 Heat Box.
- 1.3 453 Scope and Voltage Probes
- 1.4 Teletype
- 1.5 Option module and cable required:
  DK8-EA = M882 Module & 7007128 Cable
  DK8-EC = M883 Module

2.0 Test Station Set Up
- 2.1 Check paperwork in the envelope, making sure it is complete as required by DEC Standard #101.
  - 2.1.1 Test and inspection record.
  - 2.1.2 Key sheet and ECO status sheet will contain both CS and etch revision.
  - 2.1.3 Quality Control inspection report.
  - 2.1.4 PDP8/e progress report (inserted at this time).
- 2.2 Insert M882 or M883 module in the omnibus per Recommended Module Assignment List (ASP-PDP8/e-0-4).
- 2.3 Connect the red wire from the 7007128 cable to the middle hole of the amp connector (J5, H724 power supply) and either white wire on each side of the red one. Insert the Mate-N-Lock end of th cable to the M882 module. The 7007128 cable can be daisy-chained.
- 2.4 Turn on PDP8/e power.

3.0 High Speed Dump Operating Procedure
- 3.1 Set test station "On Line" switch to "Off Line".
- 3.2 Toggle into 8/e memory.
  - 3.2.1 Load address ØØØ1 through switch register.
  - 3.2.2 Deposit ØØØ1/5ØØ1
    ØØØ2/7777
    ØØØ3/7777
  - 3.2.3 Load address ØØØ1, hit clear and continue.
  - 3.2.4 This initializes the memory; the address lights will indicate ØØØ1 and MD lights will indicate 5ØØ1.
- 3.3 Set "Auto/Manual" switch to manual.
  - 3.3.1 High speed dump light will light on test panel.
- 3.4 Set "On Line" switch to "On Line".
  - 3.4.1 On Line light will light.
- 3.5 Set test station switch register to octal number of program desired.
- 3.6 Depress and release initialized switch.
  - 3.6.1 Initialize light will come on and stay there until mother recognizes stations service request then initialize light goes out.

SIZE	CODE	NUMBER	REV
A	SP	DK8-EA-2	

DEC FORM NO 16-1022 DRA 108

3.7 Program will be loaded and checked by mother computer; if load is completed, the 8/e will stop at location ØØØ1, MA = ØØØ2.
3.7.1 Initialize light is out and the loaded light goes out.
3.8 If an error, the following lights will/may be lit.
3.8.1 Receive-Data receive by mother not complete, go back to 3.1 and load again.
3.8.2 Transmit - data transmitted by mother not complete; go to 3.1.
3.8.3 Load - checksum error go to 3.1.
3.8.4 Illegal program - program non-existant; go to 3.1.
3.8.5 Had load - if load is on, hit initialize key to clear; go back to 3.1.
3.8.6 If any of the above error lights light, the program under test will have to be loaded 5 successive times to insure the 8/e is not causing the error.
3.9 Start a program.
3.9.1 In order to start a program, consult diagnostic write up for starting address.

4.0 DK8 Checkout
4.1 For jumper configurations of different frequencies (DK8-EC) along with switch register settings required, consult diagnostic write up.
4.2 The DK8-EC comes supplied with a machine inserted jumper selecting the 50 Hz frequency. The diagnostic should be run with this configuration for 5 minutes. The split lugs on the M883 module should be scoped and their correct frequency of 500 Hz., 5000 Hz., and verified.
4.3 Execution times are as follows:

Option	Minutes/Pass	Run Time	Program Octal No.
DK8-EA	2.5	5 minutes	36
DK8-EC	2.5	5 minutes	36

5.0 Heat Test
5.1 Heat test is to be run after successful completion of all previously indicated tests.
5.2 Run the DK8-E clocks diagnostic for 5 minutes with the heat box down, ports closed and heat off. Load per loading procedure step 3.0
5.3 Raise the heat switch on the test station panel and once the indicator light goes off, run the DK8-E clocks diagnostic for 10 minutes.
5.4 Turn the heat switch off and open the two ports on the left side of the heat box.
5.5 Allow 15 minutes for the machine to cool before removing the heat box.

5.6 Terminate the test once the machine has run for 5 minutes at room temperature.

6.0 Final Operation and Inspection
6.1 If shipping the DK8-EA or DK8-EC as an add-on, disconnect the M882 or M883 module from the 8/e and the cable from J5 (H724 power supply) if M882 module is used.
6.2 Check that the following paperwork has been completed:
Envelope
ECO Status Sheet
QC Sheet
8/e Progress Report

DIGITAL EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

ENGINEERING SPECIFICATION

DATE 4/1/71

TITLE DK8-EA ACCEPTANCE PROCEDURE

REVISIONS

REV	DESCRIPTION	CHG NO	ORIG	DATE	APPD BY	DATE

ENG	APPD	SIZE	CODE	NUMBER	REV
		A	SP	7665126-0-0	

ENGINEERING SPECIFICATION [redacted] CONTINUATION SHEET

TITLE DK8-EA ACCEPTANCE PROCEDURE

1.0 SET UP

1.1 Inspect M882 (DK8-EA) module to insure conformance to "Final Inspection Procedure for Flip-Chip Modules" (A-SP-7665039-0-0) and "Module Rework Standard" (A-SP-7605845-0-0).

1.2 Check the M882 (DK8-EA) module for a legible three character numerical date code.

1.3 Check the M882 module to insure the circuit and etch revisions are up to current ECO levels.

1.4 Make sure the power to the PDP8-E is turned off.

1.5 Insert the M882 (DK8-EA) module into the omnibus. Be sure you adhere to the "Recommended Omnibus Assignment List" (A-SP-PDP8-E-0-4).

1.6 Take the free end of the cable coming off of the M882 module and plug it into J5 on the power supply of the PDP8-E. If the PDP8-E also has a KP8-E (M848) module, then the DK8-EA (M882) cable may be daisy chained from the KP8-E (M848) module.

2.0 ELECTRICAL TEST

2.1 Turn on power to the PDP8-E.

2.2 Follow the loading procedure for the DK8-EA diagnostic (MAINDEC-8E-D8AA).

2.3 Run the DK8-EA diagnostic following the instructions in the program write-up, this test must run error free for a minimum of 15 minutes.

3.0 FAILURE CLASSIFICATION

3.1 Mechanical failure.

3.1.1 Any M882 (DK8-EA) module that does not meet the criterion outlined in 1.1, 1.2, and 1.3 will be classified as a failure.

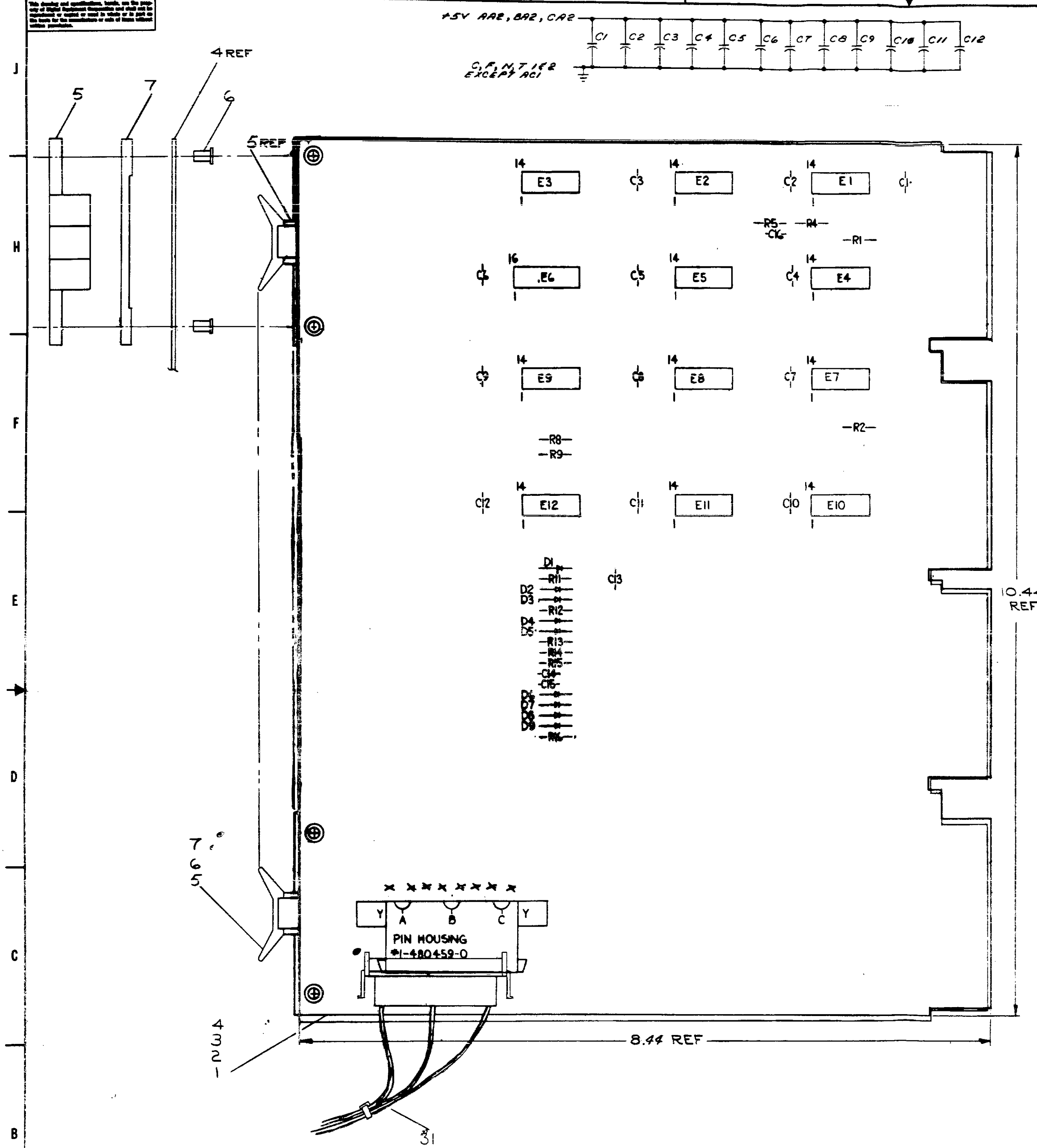
3.1.2 The acceptance supervisor has the option of either waivering the failure (using DEC waiver form 12-1026) or returning the M882 module to production for repair.

3.2 Electrical failure.

3.2.1 Any M882 which while performing 2.3 halts, generates error printouts, garble, or runs other than continuous and as specified in the diagnostic write-up will be classified defective and returned to production for repair.

	SIZE	CODE	NUMBER	REV
	A	SP	7665126-0-0	

NOTES:
1. UNLESS OTHERWISE NOTED:
DIODES = D672
CAPACITORS = .01UF 100V 20%
IC'S = 380



QTY.	REF DESIGNATION	DESCRIPTION	PART NO.	ITEM NO.
1		POWER CABLE 28 VAC	D-IA-7007128-0-0	31
8		PIN SOCKET (MATE-N-LOCK)	1209456	30
1		PIN HOUSING (MATE-N-LOCK)	1209340-0-0	29
2		WASHER FLAT #4 NYLON	9006706	28
1	E7	I.C. DEC 8881	1909705	27
1	E4	I.C. DEC 314	1909704	26
3	E1, E10, E11	I.C. DEC 380	1909485	25
1	E6	I.C. DEC 7475	1909050	24
1	E2	I.C. DEC 7402	1909004	23
1	E5	I.C. DEC 7410	1905576	22
2	E3, E8	I.C. DEC 7400	1905575	21
1	E9	I.C. DEC 7474	1905547	20
1	E12	I.C. DEC 384	1909486	19
1	R13	RES. 2.2K 1/4W 5%	1300417	18
1	R8	RES. 7.5K 1/4W 5%	1301422	17
2	R5, R9	RES. 750 1/4W 5%	1300140	16
1	R16	RES. 10K 1/4W 5%	1300479	15
2	R12, R14	RES. 1K 1/4W 5%	1300365	14
2	R1, R2	RES. 470 1/4W 5%	1300316	13
1	R4	RES. 330 1/4W 5%	1300295	12
2	R11, R15	RES. 100 1/4W 5%	1300229	11
1	C13	CAP. .005UF	1001765	10
9	D1 - D9	DIODE D672	1105275	9
15	C1 - C12, C14 C16	CAP. .01UF 100V 20%	1001610	8
4		SPACER (CABLE CLAMP)	1202704	7
8		EYELET GS4-11 STIMPSON	9006750	6
4		HANDLE FLIP CHIP-MAGENTA	9008337-06	5
1		ETCHED CIRCUIT BOARD	5009386	4
REF		MODULE HISTORY LIST	B-MH-M882-0-6	3
REF		ASSY/DRILLING HOLE LAYOUT	D-AH-M882-0-5	2
REF		X-Y COORDINATE HOLE LOC.	K-CO-M882-0-4	1

PARTS LIST

ETCH BOARD REV D

IC TYPE	GND	+5V
DEC 7475	12	5
DEC 384	1	8
DEC 314	1	8
DEC 380	1	8

GND AND 5V ARE USUALLY PIN 7 AND 14 RESPECTFULLY EXCEPTIONS ARE STATED ABOVE

IC PIN LOCATIONS

ITEM NO	AWG	FROM PT	TO PT

JUMPER LIST

DEC NO.	EIA NO	DEC NO.	EIA NO.
		D672	IN3653

SEMICONDUCTOR CONVERSION CHART

REV.	CHANGE NO.	CHK
B	ORIGINATED M882 00001	
C	DELICA	

REVISIONS

DATE 2-24-71
DATE 2-25-71

digital EQUIPMENT CORPORATION

TITLE REAL TIME CLOCK (LINE)

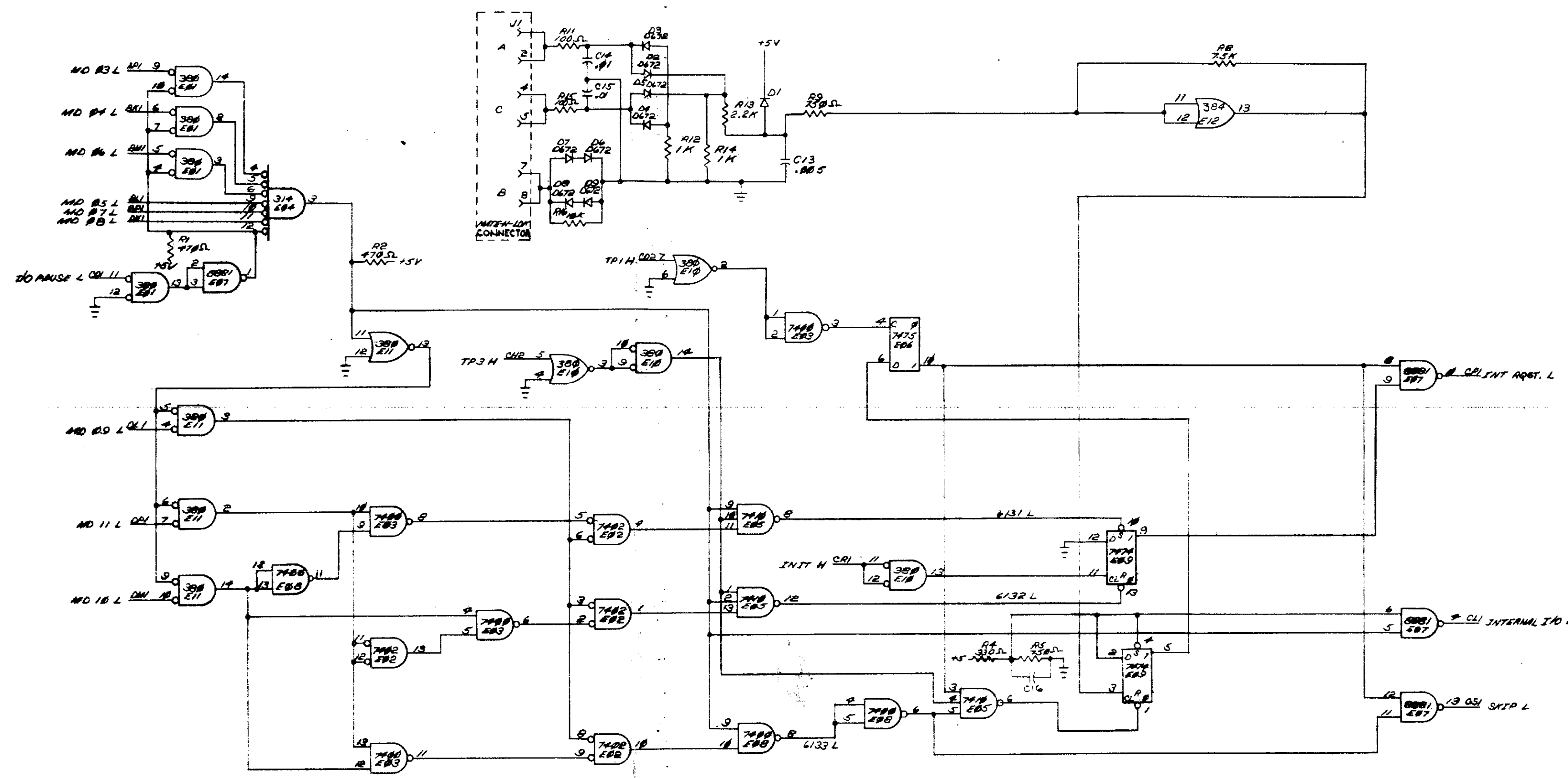
FIRST USED ON A-ML-DK8-EA

SCALE 2/1

SHEET 1 OF 2

SIZE E CODE CS NUMBER M882-Ø-1 REV. C

DEC FORM NO.



QTY.	DESCRIPTION	PART NO.	ITEM NO.

PARTS LIST

UNLESS OTHERWISE SPECIFIED
DIMENSION IN INCHES
TOLERANCES
ANGLES ± 0°30'
FINAL SURFACE QUALITY
REMOVE BURRS AND BREAK SHARP CORNERS

MATERIAL

FINISH

DRN. M. Lambert — DATE 1-15-71
CHK'D — DATE 2-24-71
ENG. — DATE
PROJ. ENG. — DATE
PROD. — DATE

FIRST USED ON

SCALE

SHEET OF

digital EQUIPMENT CORPORATION
MAYNARD, MASSACHUSETTS

TITLE
REAL TIME CLOCK (LINE)

SIZE	CODE	NUMBER	REV.
B	CS	M882 — 0 — 1	C

DIST

B CS M882-0-1 C